ERGOTEC ASSOCIATION, INC.

Human Engineering Non-Profit

P. O. Box 9571 . Arlington, Virginia 22219 . Phone-Fax (703) 516-4576

Mr. William Caton, Secretary
Federal Communications Commission
1919 M Street, NW
Washington, DC 20554

April 24, 1995

HAND CARRIED

Re: ANSI Proposed Standard - **Docket 93-62**; CTIA Petition - **Rulemaking 8577**

Dear Mr. Caton:

Please add the enclosed documents to each of the above files; Docket 93-62, Rulemaking 8577. The documents are: (1) An abstract and request from Dr. Olle Johansson of the Karolinska Institute in Sweden to the Electromagnetic Energy Association (EEA). Dr. Johansson sought to present his paper at EEA's May 8-10 conference. He found that electromagnetic radiation from video display terminals (VDTs), which emit microwaves and other radiation, induce biological disorders in VDT users. As my letter (attached) states, the fact that EEA officers, the computer and telecommunications industry, ***carefully considered*** the abstract of Dr. Johansson indicates the industry is well aware of the hazards of electromagnetic radiation. (2) A summary of Dr. Johansson's research showing that radiation is harmful to those who use electronic products, including cellular phones. (3) An article by James Bush of *The Seattle Press* (April 12-26, 1995). Bush depicts and precisely describes the anger of citizens, who fear microwave radiation will affect their health and property. The scenario Bush spotlighted will become widespread and commonplace if FCC, the states, or Congress force people to accept and live with microwave antenna radiation. One person mentioned in the article (George Curtis) submitted comments to FCC Rulemaking 8577. Please revisit the comments of Curtis, particularly the antenna schematic of US West. The microwave tower for which US West is seeking a license from the Department of Development and Land Use would sit directly above Curtis's bedroom. Macabre!

Recently, on the behest of industry, the Washington State congress proposed legislation, like that contemplated by FCC, to preempt county and local laws in the state. Fortunately, they prudently abandoned the proposal. But industry might succeed in convincing other state governments to preempt community laws. Has anyone asked "Why and who needs cellular phones, PCS, the superhighway?" The economic-driven superhighway is the master wish of industry which brainwashes congressional persons, and the public, into believing their want is really a need. High-tech devices are being fed to the public at the rate of pyramidical paranoia. Radiation from microwave towers destroys trees, animals, Earth! Radiation from electronic devices damages the health of people.

Sincerely,

Bert Dumpé - Principal

cc: FCC Commissioners (9 copies): Docket 93-62, Rulemaking 8577
Dr. Johansson; EEA; Congress (Hon. Kennedy, Oxley, Brown, Boucher, Kim, Murray, Gorton); David Wye (OTA); DOL; EPA; FDA; WA Dept. of Land Use; George Curtis; Distribution

Enclosures

ERGOTEC ASSOCIATION, INC.

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P. O. Box 9571 . Arlington, Virginia 22219 . Phone-Fax (703) 516-4576

Dinah D. McElfresh
Electromagnetic Energy Association
1255 23rd Street, NW - #850
Washington, DC 20037-1174

April 19, 1995

Fax: 202 833-3636

DOCKET FILE COPY ORIGINAL

Dear Dinah:

Members of our international consortium for the electrically sensitive forwarded a copy of the communication between you and Dr. Johansson of Karolinska Institutet in Sweden (February 10). Dr. Johansson offered to present his paper *Screen Dermatitis and Electromagnetic Sensitivity: Preliminary Observation* at your upcoming 1995 DC conference (May 8-10). Your officers and directors, who are executives of high-tech companies, carefully reviewed his abstract and rejected it.

Dr. Johansson's abstract shows that electromagnetic radiation causes, clinically visible, biological change and thereby injury. True, industry consistently denies such possibility with the remark, "Medical science has not proven electromagnetic radiation is harmful to the body." Dr. Johansson observed that, without doubt, electromagnetic radiation injures the skin, nerves, and other biologic tissues. Isn't this what the industry wanted to know? Your mission statement is: Work for a responsible and rational public policy on EMR; ie, regulation, research, education. Dr. Johansson qualifies for all this and more.

Why is industry burying its head in the sand? The television industry knew in 1964 that radiation exposure is hazardous. Recall the television incident? Telephone companies knew in 1968 that microwaves injure people. For that reason they trained employees to avoid microwave exposure. IBM has waltzed in and out of hearings, since at least 1979, assuring Congress VDTs are safe. Now Dr. Johansson, like Dr. Rae and other physicians in America and Dr. Monro of Britain, steps forward to discuss his findings which refute your claim. You slam the educational door of opportunity in his face! Do you really want to know; to protect the public from electromagnetic radiation exposure?

Be assured the prosecution will one day ask, "What did industry know about the hazards of electromagnetic radiation, and when did you know it?" Dinah, how will the high-tech electronics industry respond? Over your own signature on behalf of your members of the high-tech industry, you reveal that the abstract of Dr. Johansson was "carefully considered." An abstract that irrefutably states, "**Electromagnetic radiation of various levels, and at varied distances, and of time varying exposures, affects the body**. Judges are likely to conclude, "Industry definitely knew the hazards of electromagnetic radiation as of October 11, 1994 when Dr. Johansson submitted his abstract to EEA, whose members carefully reviewed it. Yet, industry continued to wilfully expose people to electromagnetic radiation, without their knowledge and informed consent!" Dinah, it will merely cost industry about $1500 (airfare and accommodations) to hear the findings of Dr. Johansson. In two hours, computer users waste more than that amount on printer paper. Swedish scientists are experts on radiation (towers, VDTs, etc.).

Sincerely,

Bert Dumpe'

cc: Dr. Johansson; Congress; Supreme Court; Trial Lawyers of America
EEA Officers; Distribution

ELECTROMAGNETIC ENERGY ASSOCIATION

1255 Twenty-Third Street, NW
Suite 850, Washington, DC 20037-1174
(202) 452-1070 Fax: (202) 833-3636

February 10, 1995

COPY

Olle Johansson
Associate Professor
Experimental Dermatology Unit
Department of Neuroscience
Karolinska Institutet
171 77 Stockholm, Sweden

Dear Mr. Johansson:

On behalf of the Electromagnetic Energy Association (EEA) members, I thank you for submitting an abstract for EEA's International Conference on Electromagnetic Energy scheduled for May 8-10, 1995 in Washington, DC.

EEA's Conference Committee members carefully considered your abstract, but regrettably, your paper was not selected for presentation at this year's meeting. We hope you will plan to attend the conference. Conference materials and registration information will be mailed shortly.

Once again, thank you for your interest in EEA.

Cordially,

Dinah D. McElfresh

Dinah D. McElfresh
Executive Director

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CONFERENCE ON
NETIC ENERGY

Maintaining global competitiveness in the consumer product markets and the aerospace and communications industries is dependent on advancing technologies that span the electromagnetic energy (EME) spectrum.

What are the differences or similarities in the American, European and Asia/Pacific perspectives on EME issues? What is the focus of worldwide research? Are analysis and communication techniques instilling consumer confidence or raising more questions? Are there lessons to be learned from litigation?

These and other questions will be the program topics for the upcoming Electromagnetic Energy Association (EEA) International Conference on Electromagnetic Energy. EEA was formerly the Electromagnetic Energy Policy Alliance (EEPA).

The program opens with a keynote presentation featuring Dr. John Graham, Director, Harvard Center for Risk Analysis. His remarks will focus on the value of risk analysis and informed decision making in developing societal responses to health, safety and environmental issues such as EMF. Graham will provide expert advice on developing industry strategies that address complex EMF issues.

WHO SHOULD ATTEND: Executives and engineers, managers, attorneys, scientists, health officers and safety directors—anyone whose responsibilities include understanding the issues and the answers about EMF.

REGISTER TODAY!

ABOUT EEA

EEA 1994-95 OFFICERS

Chair	JESSE RUSSELL *AT&T Bell Laboratories*
Vice President, Science & Technology Committee	JOHN OSEPCHUK *Raytheon Company*
Treasurer	BARRY UMANSKY *National Association of Broadcasters*
Secretary	RONALD PETERSEN *AT&T Bell Laboratories*

EEA 1994-95 BOARD OF DIRECTORS

JOHN BERGERON	*General Electric Company*
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BARRY KRATZ	*Ericsson Radio Systems, Inc.*
JOHN MAJOR	*Motorola Inc.*
JOHN McLEAN	*GTE Personal Communications*
KIMMO MYLLYMAKI	*Nokia Mobile Phones*

The ELECTROMAGNETIC ENERGY ASSOCIATION (EEA) formerly the ELECTROMAGNETIC ENERGY POLICY ALLIANCE (EEPA), was formed in 1984 to represent a broad range of manufacturers and users of products producing electromagnetic (EM) energy. EEA's purpose is to work for a responsible and rational public policy regarding electromagnetic energy in the areas of public policy, regulation, research and education.

Karolinska Institutet
Department of Neuroscience
Experimental Dermatology Unit

Stockholm, October 11, 1994

Amy Nelson
Electromagnetic Energy Association
1255 Twenty-Third Street, NW
Suite 850
Washington, DC 20037-1174
USA

COPY

Dear Amy Nelson,

Re: EEA '95, Loews L'enfant Plaza Hotel, Washington, DC, May 8-10, 1995:

Please, put me on the mailing list for this conference. I look forward to receive further information. Find enclosed name, address, etc., as well as an abstract.

Olle Johansson, assoc. prof.
Experimental Dermatology Unit
Department of Neuroscience
Karolinska Institutet
171 77 Stockholm
Sweden
(Telephone: 46-8-7287096 (direct); telefax: 46-8-303904 (direct).)

With my best regards
Yours sincerely

Olle Johansson
Assoc. professor

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"SCREEN DERMATITIS" AND "ELECTROSENSITIVITY": PRELIMINARY OBSERVATIONS IN THE HUMAN SKIN. Olle Johansson & Peng-Yue Liu, Experimental Dermatology Unit, Department of Neuroscience, Karolinska Institute, 171 77 Stockholm, Sweden.

The aim of this study is to investigate possible changes, in the cellular and neuronal systems, of so-called "screen dermatitis"/"electrosensitivity" patients' skin, after provocations with electric and/or magnetic visual display terminal (VDT)-fields (except "e"; cf. below). As controls, age- and sex-matched persons working with VDTs (however, without any symptoms) will serve. Immunohistochemistry using antisera to the previously characterized marker substances of interest in this specific patient category is utilized.

Initially, we have done the following: a) Investigated the presence of intraepidermal nerve fibers in normal human skin from healthy volunteers (n = 66) using the new marker protein gene product (PGP) 9.5. The intraepidermal nerve fibers are found as close as 20-40 µm from the surface of the viable skin, which makes it highly possible that weak electromagnetic fields may affect them; b) Performed a 'pilot'-study to elucidate possible changes in certain cellular (immunologic, connective tissue, etc.) markers, as well as in sensory and autonomic nerve fibers. From the preliminary data, it seems plausible to conclude that the patients (n = 9) differ from both healthy controls (n = 3) as well as from rosacea patients (n = 2), however, further control experiments are needed; c) Studied, in an open-field situation, the effect of electro-magnetic fields (EMFs) from an ordinary TV set (duration: 30, 60 or 210 minutes; distance 50 cm) on the cellular/neuronal populations of the skin of sampled patients (n = 2). From these studies, it is evident that certain paramount and profound changes in the dermis and epidermis take place; d) Investigated the presence of mast cells in skin from patients using histamine-based immunohistochemistry. Skin punch biopsies (2, 3 or 4 mm) were obtained under local anaesthesia (Xylocain, 20 mg/ml) using a laboratory holding 2-6 nA and 90 µT/s (1-2 V/m; 80-90 nT) as measured at the biopsy spot with a Friman Instrument MF-4 (size of measuring plate: 21.5 mm x 65.5 mm; 1 m^2 coil (type: MF-3) and an RC nT-converting filter; Friman Datakonsult AB, Stockholm, Sweden; equipment no. 169). From these studies, it is clear that the number of mast cells in the upper dermis is increased in the screen dermatitis patients (n = 15) as compared to normal healthy skin (n = 15). A different pattern of mast cell distribution also occurs in the patient group, namely, the normally empty zone between the dermo-epidermal junction and mid-to-upper dermis has disappeared in the patient group and, instead, this zone has a high density of mast cell infiltration. Finally, in the patient group, the cytoplasmic granules are more densely distributed and more strongly stained than in the control group, and, generally, the size of the infiltrating mast cells is found to be larger in the patient group as well; e) Started to investigate possible stimulus-response couplings, during blind provocations with fields from mobile telephones (duration: 60 minutes; distance 30-50 cm) using verbal descriptors (n = 7). The study is in an on-going phase, and therefore only preliminary observations have been made.

Recently, a new category of patients has been described in the literature, namely those who claim to suffer from subjective and objective skin- and mucosa-related symptoms after exposure to VDTs as well as other electromagnetic devices, both at their work and in their home. Some patients also have symptoms from internal organ systems, such as the heart and the central nervous system. In summary, it is evident from our preliminary data that major biological changes may be present in these patients, however, the underlying cause still has to be established by double-blind provocations. In view of the recent epidemiological studies pointing to a correlation between long-term exposures from magnetic fields and cancer, our data ought to be further analyzed.

Supported by the Swedish Work Environment Fund (proj. no. 93-0344 and 94-0375), Nokia Monitors, Sun Microsystems AB, Radians Innova AB, Sun-Flex Datamiljö AB, Käro-Produkter AB, Mägn. Bergvalls Stiftelse, funds from the Karolinska Institute, and the generous support of private donors. Ms Shan-Ying Liu, Ms Gunilla Holmkvist and Ms Eva-Karin Johansson are gratefully acknowledged for their expert technical and secretarial assistance, respectively.

Karolinska Institutet
Department of Neuroscience
Experimental Dermatology Unit

Stockholm, April 20, 1995

Bert Dumpé
Ergotec Association, Inc.
P.O. Box 9571
Arlington, Virginia 22219
USA
(via telefax 0091-7035164576)

Dear Bert Dumpé,

Leif Södergren called me today and asked me, in addition, to send you some further background regarding our on-going research. Thus, I hereby send you some material regarding the question of possible negative health effects of electromagnetic fields (EMFs) from visual display terminals, mobile telephones, fluorescent light tubes, etc.

❑❑❑

Introduction and Aim of investigation

Recently, a new category of patients has been described in the literature, namely those that claim to suffer from subjective and objective skin- and mucosa-related symptoms, such as itch, smarting, pain, heat sensation, redness, papules, pustles, etc., after exposure to VDTs, mobile telephones, etc. Some patients also have symptoms from internal organ systems, such as the heart and the central nervous system.

Clinical dermatologists often describe these patients as suffering from either some kind of earlier acknowledged skin disease, e.g. seborrhoic keratosis or rosacea, or from so-called 'techno-stress', a term first used in Japan for work-related stress. Also Pavlovian-type conditioning has been attributed to this group of patients. So far, however, very little is known about the exact cause of the above-mentioned symptoms and, thus, generally very little treatment can be offered to the patients.

The aim of the present proposal is to further investigate these changes, in the cellular and neuronal systems of the human skin, after double-blind provocations with electric and/or magnetic VDT-fields. As

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controls, age- and sex-matched persons working with VDTs (however, without any subjective or clinical symptoms) will serve.

Materials & Methods

Immunohistochemistry using antisera to the previously characterized marker substances of interest in this specific patient category. Design-based stereology will be utilized for the quantitative studies, and computer-based image processing and image analysis for the corresponding density measurements. Also conventional methods, such as light and electron microscopy will be used.

Preliminary results

Initially, we have done the following:

a) Investigated the presence of intraepidermal nerve fibers in normal human skin from healthy volunteers (n = 66) using the new marker protein gene product (PGP) 9.5. The intraepidermal nerve fibers are varicose or smooth with different diameters, running as single processes or branched, straight or bent, projecting in various directions and terminating in the stratum basale, spinosum or granulosum. They are found as close as 20-40 μm from the surface of the viable skin, which makes it highly possible that weak EMFs may affect them. They have also been further characterized using conventional electron microscopy and ultrastructural immunocytochemistry, as well as the nerve densities have been calculated for different body regions. In addition, a general and profound innervation of the dermis, including the different accessory structures, such as Meissner's corpuscles, hair follicles, arrector pili muscles, around the eccrine and apocrine sweat glands and around certain blood vessels, is also observed. Finally, numerous weakly-to-strongly PGP 9.5 immunoreactive cells are found both in the epidermis and in the dermis.

b) Performed a 'pilot'-study to elucidate possible changes in certain cellular (immunologic, connective tissue, etc.) markers, as well as in sensory and autonomic nerve fibers. From the preliminary data, it seems plausible to conclude that the patients (n = 9) differ from both healthy controls (n = 3) as well as from rosacea patients (n = 2), however, further control experiments are needed.

c) Studied, in an open-field situation, the effect of EMFs from an ordinary TV set (duration: 30, 60 or 210 minutes; distance 50 cm) on the

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cellular/neuronal populations of the skin of sampled patients (n = 2). In the biopsies taken before provocation, a remarkably high number of somatostatin immunoreactive dendritic cells was found in the dermis, preferentially around the blood vessels and hair follicles as well as in the basal layer of the epidermis. Furthermore, a profound amount of histamine positive mast cells could be detected before the start of the provocation. After provocation, no somatostatin immunoreactive cells at all could be revealed in the patients investigated using the presently employed immunohistochemical method. Regarding the histamine cells, no changes in morphology, number or fluorescence intensity were observed after the provocation, as compared to the pre-provocation state. There were no differences in the substance P, calcitonin gene-related peptide, neurokinin A, galanin, vasoactive intestinal polypeptide, peptide histidine isoleucine amide, neuropeptide tyrosine, methionine-enkephalin, dynorphin, protein S-100, neuron-specific enolase or PGP 9.5 immunoreactivities before and after the provocation, and the patterns generally looked normal. From these studies, it is evident that certain paramount and profound changes in the dermis and epidermis take place, however, the material still is small.

d) Investigated the presence of mast cells in skin from patients using histamine-based immunohistochemistry. From these studies, it is clear that the number of mast cells in the upper dermis is increased in the screen dermatitis patients (n = 15) as compared to normal healthy skin (n = 15). A different pattern of mast cell distribution also occurs in the patient group, namely, the normally empty zone between the dermo-epidermal junction and mid-to-upper dermis has disappeared in the patient group and, instead, this zone has a high density of mast cell infiltration. Finally, in the patient group, the cytoplasmic granules are more densely distributed and more strongly stained than in the control group, and, generally, the size of the infiltrating mast cells is found to be larger in the patient group as well.

e) Started to investigate possible stimulus-response couplings, during blind provocations (duration: 60 minutes; distance 30-50 cm) with electric and/or magnetic fields using verbal descriptors (n = 7). The study is in an on-going phase, and therefore only preliminary observations have been made. However, in summary, it is already obvious that several background milieu factors may interfere in such provocation studies. The Karolinska Institute has recently issued a press statement

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based upon some of these preliminary pilot experiments regarding possible health effects from mobile telephones. From these on-going double-blind provocation experiments, we have one patient that has responded correctly to a mobile telephone-based provocation 9 times out of 9 provocations ($p<2/1000$), both in the 'acute' phase as well as in the 'chronic' phase ($p<1/1000$). This would, thus, mean that there may very well be negative health effects from such mobile telephones, most likely depending on their high-frequency fields! Naturally, it is too early to draw any far-reaching conclusions, and further experiments have to be carried out. Unfortunately, due to my personal situation, I guess somebody else will have to do those forthcoming investigations... I have, actually, approached several computer and mobile telephone companies, however, with very few exceptions they have said "NO". Furthermore, the Swedish Work Environment Fund earlier had decided to 'wait' with their promised economical support for reason that, at least for me, were obscure and hazy...and now, again, an international evaluation has decided not to recommend any further sponsoring (see enclosed copies).

In summary, it is evident from our preliminary data that major biological effects may be present in the patients suffering from EMF exposure. In view of the recent epidemiological studies pointing to a correlation between long-term exposures from magnetic fields and cancer, our data ought to be further analyzed.

References (sampled ones relating to the above-described study)

(1) BERG, M. (1989). Facial skin complaints and work at visual display units. Epidemiological, clinical and histopathological studies. Doctoral Dissertation, Stockholm.

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So, in essence, there are several studies clearly pointing to a possible negative health effect from house-hold and working-place EMFs!

In return, I would be very happy to receive whatever material that you may find to be of importance for this issue, especially anything enabling us to get in contact with organizations, people, etc., interested in supporting this field of research. So far, namely, there has been a very tough 'climate' for such investigations...but I guess you already know everything about this through Leif Södergren and also through the journals MICROWAVE NEWS and VDT NEWS (attn. Louis Slesin, Editor and Publisher, P.O. Box 1799, Grand Central Station, New York, NY 10163, USA, (telefax (212)7340316)).

With my very best regards
Yours sincerely

Olle Johansson
Assoc. professor
Head of the Experimental
Dermatology Unit

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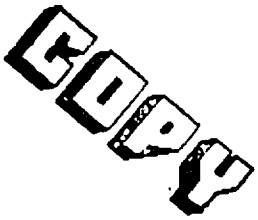
5. Olle Johansson et al.
The Experimental Dermatology Unit, Department of Neuroscience, Karolinska institute, Stockholm

5.1. General aspects



5.1.1. The composition of the study group

Project leader: Dr Olle Johansson, docent, b. 1953
100% research time

Leena Bodefjäll, research assistant
100% research time

Vladimir A. Botchkarev, guest scientist
100% research time

Gunilla Holmqvist, lab. technician
100% research time

Peng Yue Liu, PhD student
100% research time

+ 4 PhD students
10-20% research time

+ 6 students
0-10% research time

Collaborators:
Mahbub Alam and Tore Midtvedt, Microbial Ecology, Karolinska Institute
Håkan Aldskogius and Frank L. Rice, Anatomy, Karolinska Institute
Sergio Luiz Gomes Antunes, Leprosy Dept, Rio de Janeiro
Stefan Arver and Olle Söder, Endocrinology, Karolinska Hospital
Kristina Arvidson-Fyrberg, Odont. Clinics, Huddinge
Viveca Björnhagen, Plast. Surg. Dept, Karolinska Hospital
Gunvor Ekman-Ordeberg, Gynecology, Karolinska Hospital
Anders Enhamre, Danderyd
Fabrizio Fantini, Dept. of Dermatology, Osp. Civ. Riun. di Venezia
Jean Folan-Curran, University College, Galway, Ireland
Claes Hildebrand and Nenad Stankovic, Hand and Plastic Surgery, University Hospital, Linköping
Sonal Ihaveri, Massachusetts Institute of Technology
Martin Lindeberger and Åke Ljungdahl, Huddinge Hospital
Carl-Fredrik Wahlgren, Dept of Dermatol., Karolinska Hospital
Charles J. Lockwood, Mt Sinai Medical Schoil, New York
Werner Löntz, Skin clinic, Rostock, Germany
Jan Marcusson, Skin clinic, Huddinge Hospital
Lixin Wang, Center for Ulcer Research and Education, UCLA
Lennart Wetterberg, Dept of Psychiatry, Karolinska Institute
Georg McKerr and Kevin Crangle, University of Ulster, N. Ireland

Klas Nordlind, Skin Clinic, University Hospital, Uppsala
Ralf Paus, Skin Clinic, Free University, Berlin
Ake Rökaeus, Biochemistry, Karolinska Institute
HWM Steinbusch, Dept of Pharmacology, Free University, Amsterdam
Akiyoshi Takyashi, Kitasato University, Sanriku, Iwade, Japan
Wipawan Thangnipon, Mahidol University, Thailand
Robert P. Tuckett and Scott Ward, University of Utah, USA
Anders Uribe and Marjo Kapraali, Danderyd Hospital, Danderyd

5.1.2. The premises, equipment and other facilities

The premises, equipment and other facilities seem to be adequate.

5.1.3. Scientific level of the research with special reference to its strengths and weaknesses

Olle Johansson, his group and collaborators have done high level scientific work on many topics. In dermatology, they have contributed significantly to the following three topics:

1. The group has been able to demonstrate the presence of intraepidermal nerve fibers in normal human skin using a new marker protein gene product (PGP) 9.5. It has been able to demonstrate that smooth nerve fibers terminate in all living cell layers of the epidermis. PGP 9.5 positive cells have been found both in the epidermis and the dermis. The quality of all papers dealing with this matter is high. The methods used by the group are of high quality and the findings new.

2. The effect of electro-magnetic fields (EMF) from an ordinary TV set. EMF provocation decreased greatly the number of somatostatin positive cells in the skin, but no change in the number of histamine cells or in the amount of many vasoactive peptides and other substances. The results are very interesting and new, but so far preliminary because of the low number of cases investigated (n = 2).

3. Presence of mast cells in the skin of screen dermatitis patients. The number of mast cells were found to be increased in the exposed skin of screen dermatitis patients by using histamine-based immunohistochemistry. The methods are modern and the findings interesting, but very preliminary.

5.1.4. Structural and organizational aspects

The group is well organized with links to numerous collaborators. There are also a number of PhD students.

5.1.5. National and international collaboration

The number of national and international collaborators is high as is the number of visiting researchers.

5.2. The scientific quality of results presented in the publications

The quality of most recent publications is good. The list of publications in the 5+-year period of 1989 to 1995 includes 50 refereed original papers, 31 of which deal with dermatology.

5.3. The scientific and practical significance of the results presented in the publications

Finding intraepidermal nerve fibers opens new perspectives in studying and understanding skin inflammation and the generation of itch. The method for the demonstration of histaminergic nerves and the whole histamine immunohistochemistry is elegant and of high scientific value. The other studies dealing with various neurotransmitters are also of high scientific value. Whether or not they lead to practical measures remains to be seen.

The immunohistochemical methods in demonstrating neuronal markers have been optimized carefully.

Preliminary data on the changes in the skin produced by EMFs are interesting. If the findings can be confirmed, great changes in the structure and shielding of video display terminals (VDT) can be confirmed.

5.4. Competence, productivity and originality of the research group

The research group is competent in the field it is working in. The members of the group and the collaborators represent many specialities. They are very productive as can be seen in the list of publications.

5.5. Feasibility of the research plans

5.5.1. The aims of future studies:

- the study of regulatory peptides and relevant markers in different areas of normal skin.

- to continue the studies on epidermal nerve fibres and the skin symptom dermatology in screen dermatitis patients

- finalize the investigation of normal human skin versus patients with screen dermatitis

- start double-blind provocation studies in subjects with screen reaction phenomenons

5.2.2. The proposed first project is feasable. Both patient heterogeneity and the lack of standardized conditions preclude the conductance of the other studies.

5.6. The scientific and practical significance of the indicated research plans

Considering the recent controversies regarding VDU subjective face symptoms and the potential impact on society and industry, an objective and high quality clarification of the issues needs to be undertaken.

5.7. The merits of the methods adopted and proposed

The immunohistochemical methods are well established and the battery of neurotransmitters and other mediators to be investigated is wide although the significance of these findings is not yet known. The group has developed the system and the members are familiar with it.

5.8. The applicability of the results achieved and to be expected

The impact of potential results can only be assessed upon the nature of the results.

Conclusion

The group is well set up to do immunohistochemical work regarding neurobiological questions. There is a recognized lack of clinical cooperation. There is also a problem of extreme patient heterogeneity precluding systematic studies of the problem. It is, therefore, unlikely that the presently suggested scheme will provide useful answers because of the ocean of background noise.

Recommendation

Based on the present study conditions it is unrealistic to believe that useful information will be obtained from the type of study proposed. The evaluation group considers that further funding of the proposed projects on skin problems from VDTs can currently not be recommended.

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Some quick and personal 'free' comments by Olle Johansson to the international evaluation:

It is always very nice to read about yourself in terms such as the ones presented on pages 17 and 18: "Olle Johansson, his group and collaborators have done high level scientific work on many topics. In dermatology, they have contributed significantly..."; "The quality of all papers dealing with this matter is high. The methods used by the group are of high quality and the findings new."; "The results are very interesting and new,..."; "The methods are modern and the findings interesting,..."; "The group is well organized with links to numerous collaborators. There are also a number of PhD students."; "The number of national and international collaborators is high as is the number of visiting researchers."; "...is elegant and of high scientific value."; "...are also of high scientific value."; "The immunohistochemical methods in demonstrating neuronal markers have been optimized carefully."; "The research group is competent in the field it is working in. The members of the group and the collaborators represent many specialities. They are very productive as can be seen in the list of publications."

However, to my very big surprise, it says on page 19 that "Both patient heterogeneity and the lack of standardized conditions preclude the conductance of other studies". To begin with, this issue was only brought up during the lunch, which formally was outside of the 'site visit', which makes it somewhat odd to add this to an international evaluation. In addition, during this lunch the international guests revealed their absolute inferior knowledge about biological effects of electric and/or magnetic fields, where to find such fields (and at which strengths) in our modern society, terms such as frequency, amplitude, time-based derivative, μT, V/m, etc., etc., terms such as "screen dermatitis", electrosensitivity (one of the international participants actually firmly claimed (during giggle and laughter) that such patients simply are crazy), etc., etc. Heterogeneity is hardly something unique for this patient category, but is found everywhere in medical science. To overcome such difficulties, one has to use 'pilot'-study-based sampling models, a blind or double-blind code system, biological statistics, etc., things that are standard at the Karolinska Institute (after all, we *do* hand out the Nobel Prize...!). The term "lack of standardized conditions" I do not under-

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stand, simply since this was never discussed (partly dependent on the fact that the knowledge about, for instance, high frequency fields was, more or less, non-existent among the international participants).

Thereafter, however, it says on page 19 that "Considering the recent controversies regarding VDU subjective face symptoms and the potential impact on society and industry, an objective and high quality clarification of the issues needs to be undertaken". *Very good! This must mean that they want to support our research!!*

When it comes to the headline "5.8. The applicability of the results achieved and to be expected" one also states that "The impact of potential results can only be assessed upon the nature of the results". I interpret this that they want to achieve knowledge (i.e. *again they support our research*), otherwise it will not be possible to know what one is doing, producing, etc. *Once more, I am very happy to read this, since it must mean that they support our research!!*

In the conclusive part, there is again one rather odd comment: "There is a recognized lack of clinical cooperation". I just cannot understand this! On pages 16 and 17 a long list of all our collaborative units are given, including i.a. the Karolinska Hospital (incl. the dermatology clinic), the Department of Dermatology at the Venice Hospital, one of the hospitals in Rio de Janeiro, the University Hospital in Linköping, Huddinge Hospital (incl. the dermatology clinic), Mt. Sinai Medical School and Hospital, the Department of Dermatology at the Rostock Hospital, S:t Göran's Hospital, Danderyds Hospital, University Hospital in Uppsala (incl. the dermatology clinic), the Department of Dermatology at the Free University of Berlin, the School of Dentistry at the Karolinska Institute, as well as one private dermatologist (previously employed at the Department of Dermatology at the Karolinska Hospital). *What clinical unit is lacking?*

Next issue on page 19 deals with "There is also a problem of extreme patient heterogeneity precluding systematic studies of the problem". Naturally, also variables following a Poison distribution are possible to investigate, *but, and that is more important, has the international group met all the proposed patients...?...because this I have not done*

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myself, simply because the studies are not on their way because of lack of funding! And, furthermore, I do not understand the term "extreme patient heterogeneity"...? Please, can anyone explain this??

"It is, therefore, unlikely that the presently suggested scheme will provide useful answers because of the ocean of background noise". *What "ocean of background noise"?? I do not understand this statement! Explain, please!!*

Against the background given above, my own competence (as judged by the international group), the need for knowledge and data, "impact on society", etc., etc., I thought that the recommendation should be to prolong and enlarge the economical funding basis, not "Based on the present study conditions *(I do not remember that we ever discussed this; at the same time this statement is actually very harsh upon the research training programme at the Karolinska Institute which has 'produced' myself all the way to an associate professorship level...)* it is unrealistic to believe that useful information *(such "useful information" is also produced by a "bad" investigation, namely that the study design was inferior and needs to be improved until the next study; furthermore, I am very happy for any kind of constructive (!) criticism)* will be obtained from the type of study proposed. The evaluation group considers that further funding of the proposed projects on skin problems from VDTs can currently not be recommended" *(how should then the desired knowledge, data, etc., ever be gained...???).*

❑❑❑

Of course, I know that the Swedish Work Environment Fund really wants to solve the very difficult questions around so-called "screen dermatitis" and electrosensitivity/electrosupersensitivity. Therefore, I mean that it would be very unfortunate if decisions regarding future funding are based upon anything else than correct facts. Maybe the evaluation would have come out differently if the international participants themselves would have been experts in the field? It is a pity that none of the referees suggested by myself (after an enquiry from the Swedish Work Environment Fund) ever was used...

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TOWERING CONTROVERSY

Expansion of cellular antenna systems a local, national issue

By JAMES BUSH

In Seattle, the battleground is an aging apartment building on a noisy corner of Northeast 65th Street.

Residents of the Ravenna-Bryant neighborhood are fighting the installation of a cellular telephone antenna on the roof of the 20-unit building, citing concerns about possible health effects from microwave radiation emissions. Also of concern is future growth in the number of cellular antennas and their potentially detrimental effects on neighborhood property values. "It's like having them build a smokestack in your back yard," commented Brian Peyton, president of the Ravenna-Bryant Community Association, at a recent meeting.

But, as the cellular telephone industry continues its phase of rapid expansion, skirmishes between citizens and towerbuilders have become more frequent. In Snohomish County, the Hearing Examiner rejected a proposed tower just outside the city of Edmonds after US West Cellular representatives failed to provide detailed information on the facility. On Mercer Island, neighborhood residents are trying to get the city to reverse a decision to allow a tower on the grounds of a private school.

As cellular phone services expand to rural areas, major dustups over antenna proposals have been fought in Yelm and Carnation. Cellular towers have also been controversial in California communities; in San Francisco, school district officials nixed a proposal to mount a tower on the roof of a public high school and have announced that existing towers on four other school buildings will be removed when the cellular company's leases expire.

In Washington, D.C., two cellular industry groups are appealing to a higher power — The Federal Communications Commission (FCC) — to pre-empt local land use controls on cellular towers and ban states, cities and counties from imposing their own emissions standards for microwave radiation. In Olympia, a similar provision to override local land use siting and environmental study regulations for cellular towers was recently inserted into — and later removed from — a proposed amendment to Washington state's Growth Management Act.

Seattle, which imposed a radiofrequency (RF) exposure standard of 200 microwatts per square centimeter (200 uW/cm^2) in early 1992, is one of the few cities nationwide to have such a standard in place. However, the land use requirements included in that same legislation for the siting of cellular towers are relatively loose — requiring only the issuance of a city conditional use permit to allow towers on buildings in some residential zones. In fact, Seattle's policies show a marked preference for towers mounted on buildings compared to freestanding structures.

Cellular towers were only a minor feature of the debate over Seattle's 1992 telecommunications policies and regulations, recalls City Council member Sue Donaldson, then chair of the Council's Land Use Committee. At that time, several of the city's major television stations were seeking to enlarge their transmission towers, she explained, so that issue dominated the discussion.

"(Cellular antennas) were on the scope of work at the beginning, but we'd have meetings and people would talk about the television towers," said Donaldson. "We talked in committee about whether we should go through another set of hearings (about cellular antennas). There was so little interest, we decided to leave the law as we amended it and see if there were issues that developed."

Dr. Arthur Guy, a professor emeritus at the University of Washington and a member of the scientific advisory committee for the Seattle policies, said that he isn't surprised that high-power emitters of radiofrequency radiation like television towers ruled the debate. Cellular phone transmitters are among the least-risky emitters of radiofrequency radiation, he said, mainly because of the low levels of power needed to operate them (a cellular base station can take less than 100 watts of power to operate). In fact, if too much power was used, the transmissions would interfere with those in adjacent cells (cellular coverage areas), he noted.

"The (power) levels there are extremely low — it's probably the lowest level exposure of anything in the environment," Guy said.

Steve Morgan photo

Opponents of a proposed cellular antenna in Ravenna helped organize this March 1 protest at U.S. West's headquarters in downtown Seattle.

'Today, a farmer is just as likely to have a cellular phone in his tractor as a businessman is in his car.'

— Lisa Bowersock, U.S. West Cellular

EVEN THOUGH THIS controversy is late in coming, the cellular telephone industry could hardly be characterized as low-profile. Last year, U.S. West Cellular had a 61 percent increase in its total number of customers, according to Lisa Bowersock, manager of media relations for the cellular giant's Western Region.

And, as the customer base grows, so must the company's stock of antenna sites, she said. "The capacity of each cellular site is finite."

Cellular phone companies are also in a constant process of improving their transmission facilities for competitive reasons. The FCC issues two cellular licenses in each market (the second Western Washington licenseholder is Cellular One), so the number and location of cellular antenna sites are an important competitive tool, said Bowersock. "I am often asked the question, 'Why don't you just locate on the same tower to limit the number of towers in a given area?' Coverage is an important aspect of competition in the cellular business," she said. "It's like asking competing car dealerships to share lots."

As the fledgling cellular industry enters its second decade, the expectations of its consumers have grown significantly, she said. "Five years ago, when the cellular business was in its infancy, it was basically a business tool and people were satisfied if (cellular phones) worked downtown, on the I-5 corridor, the I-90 corridor and the I-405 corridor," said Bowersock. "Today, a farmer is just as likely to have a cellular phone in his tractor as a businessman is in his car — and that has driven the expansion of cellular service into rural areas."

Just last month, the FCC auctioned off licenses for a new, lower-power cellular system known as PCS, again assigning two local licenses. The two new cellular operators in Seattle — GTE Macro Communications and a consortium including long-distance provider the Sprint Corp. — each paid the federal government more than $100 million for the local franchise.

Cellular service has provided the first phone service in some especially isolated rural areas, such as on Mount Baker, where a cellular transmission site was activated last year, said Bowersock. Cellular phones are also in big demand by boaters, as cellular services are often available in areas where marine radio isn't, she said.

However, even in an urban area well-served by cellular companies, topography can provide major challenges, said Bowersock. One

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major "weak spot" in the Seattle grid is the Ravenna neighborhood, which would be served by the controversial roof-mounted antenna at 6500 25th Ave. NE.

This particular application might not have seemed like a likely focal point for galvanizing local concerns about cellular facilities, but that is what has happened. Led by George Curtis and community council president Peyton, the Ravenna activists have forced the city to hold two public meetings on the antenna application (including a Jan. 4 meeting which drew more than 120 people), garnered support from other community groups for further investigation of possible health effects from cellular antennas and organized a March 1 picket line at the U.S. West building in downtown Seattle.

THE SEATTLE CITY Council's Housing, Community Development and Urban Environment Committee has even added a review of cellular transmitter siting regulations to its 1995 work program. According to a Jan. 31 memo from Committee Chair Sherry Harris, the committee will hold community meetings and hear briefings by scientific experts, although Harris has rejected a call for a moratorium on cellular antenna permits during the review process.

Peyton argues that the antennas raise important land use issues, including the presence of an installation designated by the city as a "communications utility" in a residential area. "It's an ugly protuberance on a building that already exceeds the height limit in this zone," he said. "We just don't want this industrial facility in our neighborhood."

He also states that the resale value of nearby properties could also be impacted by the antenna. Under the state's strict new real estate disclosure law, he said, neighborhood property owners would have to inform potential buyers about the presence of the antenna. Even if health concerns about the antennas are unproven, "definitely that concerns people, so given that, I think you'd be foolish not to put it on your disclosure form."

Steve Morgain photo

Seattle land use planner Beth Rice faces the crowd at a Jan. 4 public meeting on the Ravenna cellular antenna application.

Curtis has taken on the role of the neighborhood's scientific investigator, devouring reports from scientific journals and contacting experts around the country. He also has contacted other citizens working to battle cellular phone towers proposed in their communities.

He said he was surprised by the lack of protections for residents in the Seattle land use process. The requirements for obtaining an administrative conditional use permit to allow the installation of the antenna have more to do with aesthetics than possible health effects, said Curtis. "There's one box on the SEPA (State Environmental Policy Act) checklist that deals with human health." At press time, the decision on U.S. West's conditional use permit application for the Ravenna tower had not yet been issued.

Curtis was also dismayed to find out about the cellular companies' attempts to override local siting regulations through their petition to the FCC. He said the FCC was granted override authority by Congress through a provision slipped into 1993 budget legislation, which modified the 1934 law authorizing the formation of the FCC. "The *major modification of an act that's* been around since 1934 went in as a paragraph in a budget act," said Curtis. "It seems like a little bit of a disappearance of those produced by power transmission lines at 60 hertz) to visible light (500 trillion hertz). Microwaves are found high on the spectrum (300 million hertz to 300 billion hertz), at far higher frequencies than standard radio and television signals. Common producers of microwaves include military and police radar, air traffic control systems and earth-to-satellite television broadcast equipment.

At very high intensities, microwaves can heat human tissues (much like a microwave oven heats a roast — although, if properly shielded, these ovens should emit no radiofrequency radiation). Harmful effects at lower levels have proven more elusive, but a debate over the existence of possible effects rages on in the scientific community. Of particular interest are indications that lower levels of exposure can affect the eyes (which have no cooling mechanism), the brain/blood barrier and communication between cells. Of greatest concern are cells in non-equilibrium states — embryonic cells (such as those in children's bodies), cells active in healing and transformed (cancer) cells.

"Every cell and every molecule in our body is essentially electronic in nature," said Carroll Cobbs, a Seattle bioengineer who has testified against cellular tower applications in several West Coast Communities. "More and more research is beginning to show that very small exposures can cause genetic changes at the cell membrane. The cell is a remarkable machine and it doesn't take very much to affect it, internally or externally."

Dr. Russ Adey, a pioneer in bioengineering, describes the process as "whispering between cells." Adey argues that extremely low-power electromagnetic fields can affect these delicate relationships between cells in living tissue.

Most radiofrequency radiation safety standards are created by reducing by a factor of ten the exposure levels which produce tissue heating, said Cobbs, but exposures which meet those standards could well produce cellular effects. "We don't know what the thresholds are," he said.

Cobbs, like some other critics, questions whether cellular phone companies are really interested in finding out more about possible health effects from exposure. "(Industry officials) rest on their laurels, saying there is no research that shows they have any effect," he said.

Louis Slesin, editor of the New York City-based *Microwave News*, argues that research on the effects of all sources of electromagnetic fields is woefully inadequate. "We're surrounded by the stuff and the bad news is, we don't have a clue what it does to people," he said.

Slesin's 15-year-old publication reports on scientific studies on non-ionizing radiation — and its subscribers include power companies, phone companies and television stations. He said the growth of the cellular phone industry, and the resulting proliferation of cellular phone antennas, is probably the hottest issue he covers in terms of interest from the general public.

"I get more phone calls on cellular phone towers than anything else — mainly because the whole country is being divided up into cells," he said, although not necessarily because cellular towers are the greatest health risk among the topics he covers. "People tend to deny what's already there and fight like heck against what's coming in," he said.

Slesin's major complaint is that studies which seem to document significant effects are never followed up — mainly because most funding for scientific research comes from the industries most closely affected by it. He cited a 1993 Virginia study in which human brain tumor cells were given a single, two-hour exposure to microwaves just slightly above the accepted human exposure standard. Five hours later, the cells were still reproducing out of control, he said. "Now, would you think that (study) should be replicated? Is it significant? Has it been repeated? No."

A VERY RECENT — and very local — example of this behavior by the industry is a study completed by Drs. Henry Lai and Narendra Singh of the University of Washington. After only a single, two-hour exposure of low-level microwave radiation, DNA breaks were observed in the brain cells of rats. These breaks have been related to the initiation of cancer, so this study could indicate that microwaves might cause — and not just promote — cancer.

Even though its authors have dismissed such conclusions as premature, they received a cold reception when they attempted to obtain funding from the Scientific Advisory

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> *'The cell is a remarkable machine and it doesn't take very much to affect it, internally or externally.'*
> *— Carroll Cobbs*

what we call a democracy."

Although many of their Ravenna neighbors have concerns about the cellular antenna, a few attended the public meetings on the project to argue the merits of technology. "I spend a lot of my day in front of equipment that spews out a lot of bad rays — like a computer, a television and a microwave oven," said Ravenna resident — and U.S. West Cellular customer — Grant Bower. "I do that for a reason, because I enjoy the benefits these things give me."

Electrical engineer Eric Drucker agreed that the risks of cellular systems are minor. "There's risk in anything we do; nothing is absolutely safe," he testified at the January meeting.

However, most of the Ravenna neighbors testifying at the meetings seemed more in agreement with Tony Wilson, who argued that many products consumers have assumed to be safe have later turned out to be harmful, even deadly. "We've seen DDT, we've seen silicone breast implants, we've seen asbestos and we don't need any more of this," he said.

Curtis, who is not only a resident of the apartment building in question, but its resident manager, said he thinks older buildings like his are targeted as antenna sites because the lower-income tenants they house are less likely to be listened to by government officials. Curtis said that the owner of the Corner Manor Apartments, who has since stated that he would not have signed a lease with U.S. West Cellular if he had realized it would upset his tenants, has made no attempt to interfere with his activism on the cellular tower issue.

Peyton said that neighborhood residents opposed to the tower are not taking "an anti-technology position." The question of health risks related to the towers simply hasn't been addressed to their satisfaction, he said. "We think that there's sufficient evidence of harm or at least there's not sufficient proof that they're safe."

UNFORTUNATELY, BY SCIENTIFIC standards, those are two vastly different issues.

Microwaves are a part of the non-ionizing electromagnetic spectrum, which ranges from extremely low frequency waves (like

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Group on Cellular Telephone Research (SAG), an organization funded by the Cellular Telephone Industry Association. In an article published last November in *Microwave News*, Slesin detailed how the hostile reception from the SAG led Lai and Singh to withdraw their request for a grant to replicate the study. After being excluded from a panel workshop discussing their findings, Singh told *Microwave News*, "When you are executing a person, you should have a fair trial."

Slesin said several other studies featuring low-level microwave exposures have had the same generic effects as the Lai-Singh study. "The Henry Lai work is extremely important," he said. "It's indicative of how much we don't know."

When the possible health effects of microwaves are discussed, one name which invariably appears in the discussion is that of the UW's Dr. Guy, who founded the school's bioelectromagnetics research lab. He counts Cobbs among his former students and has worked in the lab with Lai and Singh. Guy is also a member of the SAG and a longtime consultant for the cellular telephone industry.

Although he phrases his objections differently, Guy agrees with Slesin that scientific studies of microwaves need to be removed from direct cellular industry control. He said the SAG is working to set up an arrangement under which its research efforts would be funded through a trust fund set up by the industry, rather than directly by the CTIA.

In urban areas, the cells served by a single antenna are smaller and antennas are closer together, so power levels are very low, said Guy. Even in rural areas, where more power must be used to cover longer distances, the emissions are well within safety standards, he said. Guy also noted that, because the antennas are aimed at other cellular base stations, the radiation emission level is lowest directly below the tower itself.

The hot issue in cellular telephone research, rather than base station antennas, is the direct exposure caused by the antennas of hand-held cellular phones. Guy said the SAG is looking not only at funding laboratory studies, but epidemiological studies as well. (Epidemiological studies seek to find commonalties between persons affected by diseases rather than establish direct links between conditions and the disease.) Cellular phone studies will be easier to accomplish and more exact than many epidemiological investigations because phone users are charged by how much time they spend on the phone and extensive records have been kept, said Guy.

"It's really getting the expertise focused on the problem. That's really the problem of the portable phones — you get exposures well below the safety standard, but it's very close to the head," he said. "Right now, we're trying to develop a head-only exposure system for lab animals, so we can duplicate the cellular telephone exposures."

Guy said the SAG is coordinating peer review of the scientific techniques used in the Lai study, but added that he isn't sure the study itself will be replicated. "There's been a lot of pressure to replicate the Lai studies, but that's being done with full body exposure and it's not really the type of exposure we're getting from cellular telephones," he said.

So what happens if the studies find a danger in the hand-held phones? Slesin said he is sure the industry could re-design the phones and they would continue to sell. "That's the American way. We like technology, we like instant communication and it's been very good for us. But it might mean that we should be designing with safety in mind.'"

As for the danger of rooftop antennas, the two major local spokespeople for the cellular industry can only point up.

During Seattle's controversy over television transmission towers, reporters "asked me if I'd have an antenna like that on my roof," said Guy. "And I pointed to my roof, where I have a ham (amateur radio) antenna."

Likewise, U.S. West Cellular's Bowersock notes that the company's Bellevue corporate headquarters is topped by a cellular transmission tower — and its executives occupy top-floor offices. "Often I'm asked that question, 'Would you have one on your roof?' " said Bowersock. "And I say 'I do.' "